

WHAT IS CLAIMED IS:

- 1 1. A beam control processor for use with a transceiver employing an inertial sensor and
2 capable of transmitting a laser beam to an other transceiver, comprising:
3 a line-of-sight estimation subsystem configured to provide a line-of-sight pointing vector
4 of said laser beam based on acceleration inertial motion data provided by said inertial sensor; and
5 a line-of-sight control subsystem configured to generate beam steering commands for
6 said transceiver as a function of said line-of-sight pointing vector.
- 1 2. The beam control processor as recited in Claim 1 wherein said line-of-sight estimation
2 subsystem is configured to provide said line-of-sight pointing vector of said laser beam based on
3 receiver orientation feedback data and transmit position feedback data associated with said
4 transceiver.
- 1 3. The beam control processor as recited in Claim 1 further comprising a coordinate
2 transform subsystem configured to provide line-of-sight data about said other transceiver based
3 on outer control loop data including a line-of-sight pointing data and an inertial motion of said
4 other transceiver.
- 1 4. The beam control processor as recited in Claim 3 further comprising a relative line-of-
2 sight estimation subsystem configured to provide line-of-sight commands based on said line-of-
3 sight data about said other transceiver and said line-of-sight pointing vector associated with said
4 transceiver.

1 5. The beam control processor as recited in Claim 4 wherein said line-of-sight control
2 subsystem is configured to provide said beam steering commands based on said line-of-sight
3 commands and a beam center error associated with said other transceiver.

1 6. The beam control processor as recited in Claim 1 further comprising a residual beam
2 centering error subsystem configured to provide outer control loop data based on line-of-sight
3 data and a beam centering error of said transceiver.

1 7. The beam control processor as recited in Claim 1 wherein said line-of-sight control
2 subsystem is configured to provide receiver orientation commands as a function of said line-of-
3 sight pointing vector.

1 8. A method of providing beam steering commands for use with a transceiver employing an
2 inertial sensor and capable of transmitting a laser beam to an other transceiver, comprising:
3 providing a line-of-sight pointing vector of said laser beam based on acceleration inertial
4 motion data provided by said inertial sensor; and
5 generating beam steering commands for said transceiver as a function of said line-of-
6 sight pointing vector.

1 9. The method as recited in Claim 8 wherein said providing said line-of-sight pointing
2 vector of said laser beam is based on receiver orientation feedback data and transmit position
3 feedback data associated with said transceiver.

1 10. The method as recited in Claim 8 further comprising providing line-of-sight data about
2 said other transceiver based on outer control loop data including a line-of-sight pointing data and
3 an inertial motion of said other transceiver.

1 11. The method as recited in Claim 10 further comprising providing line-of-sight commands
2 based on said line-of-sight data about said other transceiver and said line-of-sight pointing vector
3 associated with said transceiver.

1 12. The method as recited in Claim 11 wherein said generating said beam steering commands
2 is based on said line-of-sight commands and a beam center error associated with said other
3 transceiver.

1 13. The method as recited in Claim 8 further comprising providing outer control loop data
2 based on line-of-sight data and a beam centering error of said transceiver.

1 14. The method as recited in Claim 8 further comprising generating receiver orientation
2 commands as a function of said line-of-sight pointing vector.

1 15. A transceiver, comprising:
2 a housing that provides a foundation for said transceiver;
3 an inertial sensor, coupled to said housing, configured to provide acceleration inertial
4 motion data associated with said transceiver;
5 a transmitter element configured to transmit a transmitted laser beam to an other
6 transceiver;
7 a receiver element configured to receive a received laser beam from an other transceiver;
8 and
9 a control processor, coupled to said transmitter and receiver elements, configured to
10 provide beam steering control for said transmitter element and orientation control for said
11 receiver element, including:
12 a beam control processor, including:
13 a line-of-sight estimation subsystem configured to provide a line-of-sight pointing
14 vector of said transmitted laser beam based on acceleration inertial motion data provided by said
15 inertial sensor, and
16 a line-of-sight control subsystem configured to generate beam steering commands
17 for said transmitter element as a function of said line-of-sight pointing vector.

1 16. The transceiver as recited in Claim 15 wherein said line-of-sight estimation subsystem is
2 configured to provide said line-of-sight pointing vector of said transmitted laser beam based on
3 receiver orientation feedback data and transmit position feedback data associated with said
4 transceiver.

1 17. The transceiver as recited in Claim 15 wherein said beam control processor further
2 comprises a coordinate transform subsystem configured to provide line-of-sight data about said
3 other transceiver based on outer control loop data including a line-of-sight pointing data and an
4 inertial motion of said other transceiver.

1 18. The transceiver as recited in Claim 17 wherein said beam control processor further
2 comprises a relative line-of-sight estimation subsystem configured to provide line-of-sight
3 commands based on said line-of-sight data about said other transceiver and said line-of-sight
4 pointing vector associated with said transceiver.

1 19. The transceiver as recited in Claim 18 wherein said line-of-sight control subsystem is
2 configured to provide said beam steering commands based on said line-of-sight commands and a
3 beam center error associated with said other transceiver.

1 20. The transceiver as recited in Claim 15 wherein said beam control processor further
2 comprises a residual beam centering error subsystem configured to provide outer control loop
3 data based on line-of-sight data and a beam centering error of said transceiver.

1 21. The transceiver as recited in Claim 15 wherein said line-of-sight control subsystem is
2 configured to provide receiver orientation commands as a function of said line-of-sight pointing
3 vector.